

Description For The General Public (In English)

Graphene has unique optical, mechanical and electrical properties and it could serve as an elastic, transparent electrode in OLED-based light sources. However, its structure is not fully suited for other, organic elements of the diode. Such matching can be achieved by deposition of transition metal oxide (TMO) layers onto graphene and forming so called hybrid system. Here, we based on the fact that hybrid structure has a new functionality which is not direct sum of each element properties. Hybrid materials (graphene/TMO) created this way could have very attractive applications, however, physical and chemical mechanisms responsible for their properties have not been identified yet. This project will address these scientific problems. In frame of the project a series of graphene-oxide and graphene-oxide-light emitting material systems will be constructed. They will be adjusted to allow full possible research conducted both in macro- and nanoscale. Wide range of experimental and theoretical methods will allow for identification of basic relationships between the construction of the systems and their properties. In particular a knowledge will be gained, related to mechanisms behind the effectiveness of the charge carrier transport and effectiveness of the light emission in OLED systems with graphene electrode. In spite of the basic nature of this research, the results will contribute in the future to the development of emerging new technology of organic electronics.